1977

G77-330 Estimating Pork Carcass Lean (Revised June 1994)

Dennis E. Burson
University of Nebraska - Lincoln, dburson1@unl.edu

G77-330-A
(Revised June 1994)

Estimating Pork Carcass Lean

Four procedures for pork carcass evaluation are given here, along with illustrations.

Dennis E. Burson, Extension Meat Specialist

Pork carcass value is an important factor affecting the profitability of the pork industry. Reproduction traits and growth performance are easily recognized as keys to the profitability and health of the pork industry, yet carcass value also plays an important role. Differences in carcass product value are monetarily recognized by recognizing differences in carcass weight and grade. In addition, the pork industry recognizes that consumption of pork may key on public health concerns relating to reducing fat consumption and the resulting consumer demand for lower fat products.

Effective methods of pork carcass evaluation are needed by the industry to improve productivity and product quality and also to realize value differences at the market place. In competitive situations, carcass evaluation has provided stimulation for change and exposed major value differences. Carcass evaluation can be used by the industry to make important genetic changes.

For the pork industry to take advantage of carcass evaluation programs, the procedures must be practical, reflect value differences and provide a consistent picture of carcass merit. In addition, procedures which are too expensive will not be used.

Four procedures which rely on carcass measurements taken before the carcass is cut or on the use of ultrasound with live hogs will be described. These procedures were developed from carcass cutout research and are recommended by a committee appointed by the National Pork Producers Council (NPPC). The procedures estimate the weight of lean in the carcass which then can be expressed as a percent of carcass weight. The concept of estimating carcass lean content and the following procedures have been adopted nationally and allow for common and consistent carcass evaluation.

Estimation Procedures

Four procedures for estimating lean weight are listed below. The first procedure, using loin muscle area, is more accurate, but is more difficult to obtain. When loin muscle area is not available, the second and third procedures, which require no carcass cutting, will give satisfactory results. The fourth procedure can be used when the hogs cannot be slaughtered. The first procedure allows for evaluation of the lean quality characteristics and is desired for comparison of individual carcasses for competitive events.

In all procedures, carcass weight is a critical measurement. If cold carcass weights are used, they should be divided by 0.985 to convert to hot carcass weight. If the carcass is skinned, the weight of skinned carcasses should be divided by 0.94 to convert to skin on basis. In cases where the carcass has been trimmed, carcass weight should be adjusted to compensate for the trim. If the trim is severe--removal of abscessed jowls or arthritic joints from the shoulder or ham--the carcass should be eliminated from competition. When trimming is done for the convenience of the plant or inspector, every effort should be made to establish an adjusted carcass weight.

Hot carcass weight, tenth rib fat thickness over the loin muscle and loin muscle area at the tenth rib are measured to predict the pounds of lean with procedure 1.

Procedure 1. For ribbed carcasses.
Lb. lean = 7.231 + (0.437 x hot carcass wt., lb.)
+ (3.877 x 10th rib loin muscle area, sq. in.)
- (18.746 x 10th rib fat depth, in.)

Loin eye area (*Figure 1*) can be measured on the hanging carcass by cutting through the backbone and loin eye muscle between the 10th and 11th ribs perpendicular to the backbone.

Figure 1. Hanging carcasses can be ribbed for measuring loin eye area and fat thickness.

The area of the loin eye may be either measured directly, using the plastic grid or indirectly by tracing the outline of the loin eye on acetate paper for later area determination (*Figure 2*). Fat thickness, including skin, is measured at the 10th rib over the loin eye perpendicular to the skin three-fourths of the way out over the loin eye (*Figure 3*). Fat measurements on skinned carcasses should be increased by 0.15 inch for reporting and calculation.

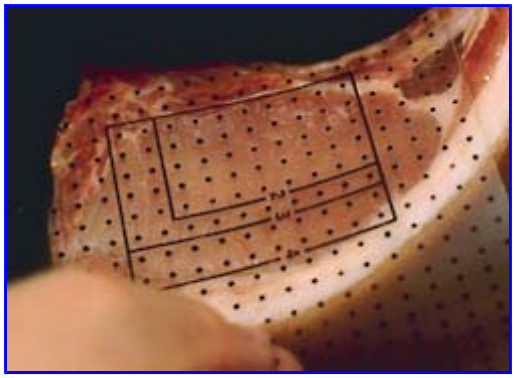


Figure 2. Loin eye muscle can be traced on acetate paper (a) for later area determination, or determined directly using the plastic grid (b).

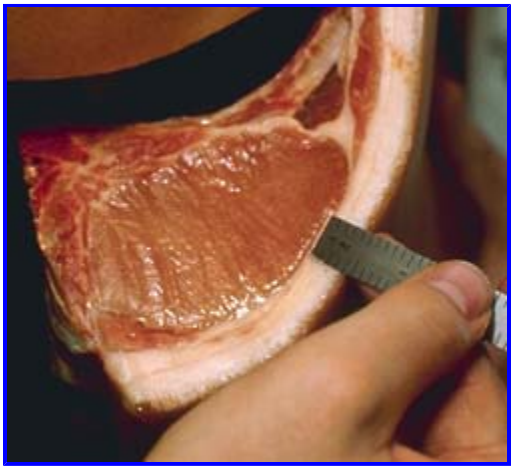
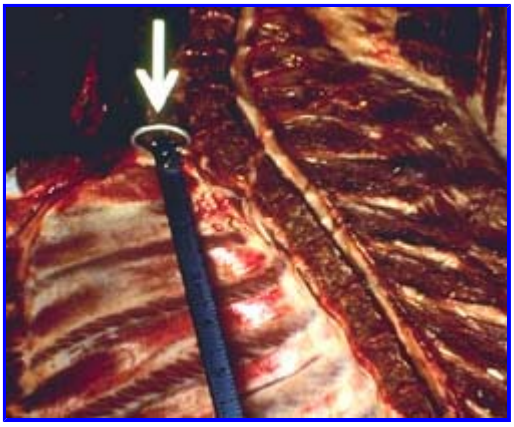
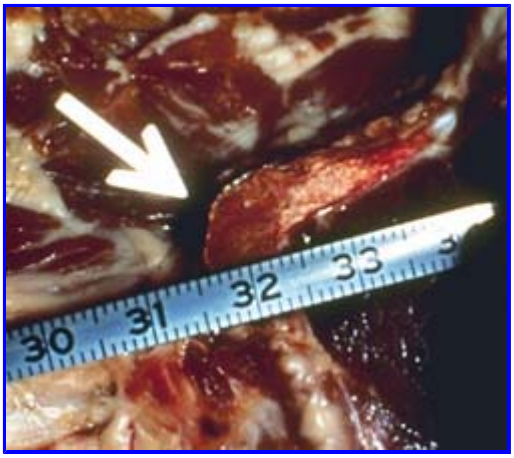


Figure 3. Fat thickness at the 10th rib, measured 3/4 of the way out over the loin eye muscle.

Hot carcass weight, carcass muscle score, last rib carcass backfat thickness and carcass sex are combined in Procedure 2 to estimate lean weight. No carcass cutting is required with this procedure. Last rib carcass backfat thickness is determined by midline fat thicknesses, including skin, measured opposite the last rib (*Figure 4*). Skinned carcass should be increased by 0.15 inch. Muscle score is evaluated visually and is scored 1 for thin, 2 for intermediate and 3 for thick muscling.

Figure 4. Carcass backfat measurements opposite last rib (a) are made perpendicular to the skin (b). Length is measured from the anterior tip of the first rib (c) to the anterior tip of the aitch bone (d).





Procedure 2. For unribbed carcasses.
Lb. lean = 8.179 + 0.427 x (hot carcass wt., lb.)
+ 6.290 x (carcass muscling score)
- 15.596 x (last rib backfat thickness, in.)
+ 3.859 if sex=gilt.

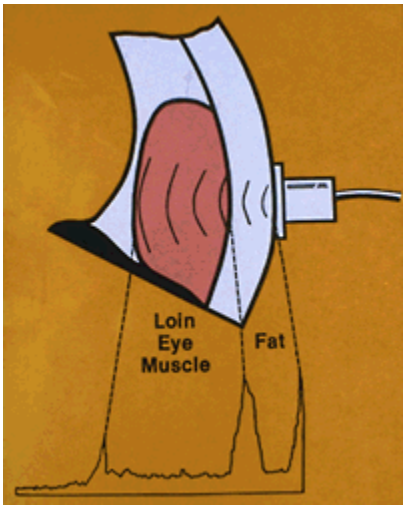


Figure 5. Electronic or sonic probes can be used to detect the different tissue layers and measure fat and loin muscle depth.

Hot carcass weight, fat depth at the tenth rib and loin muscle depth at the tenth rib are the factors needed for predicting lean weight using procedure 3. Fat and loin muscle depth are measured either by use of alight reflecting or sonic probe that determines the different tissue layer depths (*Figure 5*) or manually with the use of a metal probe. No carcass cutting is required for this procedure.

Procedure 3. For unribbed carcasses.
Lb. lean = 2.827 + 0.469 x (hot carcass wt., lb.)
+ 9.824 x (loin muscle depth, in.)
- 18.470 x (last rib backfat thickness, in.)

Pounds of lean can be estimated using procedure 4 for live hogs using ultrasonics and a trained technician. Fat depth and loin muscle area at the 10th rib are measured by ultrasonics and live weight is used rather than carcass weight. Since live weight is influenced by variation in fill and since muscle quality is not observed, this method is the least preferred.

Procedure 4. For live hogs using ultrasonics.
Lb. lean = 3.950 + (0.308 x live wt.)
+ (4.693 x 10th rib loin muscle area, sq. in.)
- (16.440 x 10th rib fat depth, in.)

Application. Percent lean is determined by dividing lean weight by carcass weight or live weight multiplied by 0.74 (procedure 4). Lean percentage is the appropriate end point when carcass value is of

interest, such as at market hog shows. In such situations, minimum standards should be met. These standards are at least 150 lbs. hot carcass weight, 4.5 sq. in. loin eye area, 29.5 in. in length and acceptable lean quality. Carcass length is measured from the anterior edge of the aitch bone to the anterior edge of the first rib next to the backbone (Figure 4). Minimum standards for lean quality traits are presented in *Table I.*

More detailed descriptions of these procedures are in *Procedures to Evaluation Market Hogs, Third Edition, 1991* available from the National Pork Producers Council.

Commercial pork producers find the results of carcass evaluation helpful as a quality control measure. They can compare their pigs with national standards, and through competitive events, with their neighbors. Breeders find carcass evaluation helpful in identifying superior genetic material for carcass characteristics in their herds. Breeders also find that a carcass evaluation and improvement program in their herd helps assure customers that their breeding stock will produce desirable market hogs.

Table I. Lean quality traits for pork carcass evaluation.

Trait	Scores				
	1	**2**	**3**	**4**	**5**
Muscle Firmness	**Very Soft and Watery**	**Soft and Watery**	Slightly Firm and Moist	Firm and Moderately Dry	Very Firm and Dry
Muscle Color	**Pale Pinkish gray**	Grayish Pink	Reddish Pink	Purplish Red	**Dark Purplish Red**
Marbling	**Devoid and Practically Devoid**	Traces to Slight	Small to Modest	Moderate to Slightly Abundant	**Moderately Abundant or Greater**
(descriptions that are bold are considered UNACCEPTABLE)					

File G330 under: SWINE
E-1, Marketing
Revised June 1994; 3,000 printed.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Elbert C. Dickey, Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.